

IN THE CLAIMS

Cancel claims 1-26 and insert new claims 27-55 as shown on the attached sheets.

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Claims 1-26 (canceled)

27. (new) A process for preparing optionally alkyl-substituted 1,4-butanediol by two-stage catalytic hydrogenation in the gas phase of C₄-dicarboxylic acids and/or of derivatives thereof having the following steps:
- a) introducing a gas stream of a C₄-dicarboxylic acid or of a derivative thereof at from 200 to 300°C and from 2 to 60 bar into a first reactor and catalytically hydrogenating it in the gas phase to a product which contains mainly optionally alkyl-substituted γ -butyrolactone;
 - b) removing succinic anhydride from the product obtained in step a), preferably to a residual level of from < about 0.3 to 0.2% by weight;
 - c) introducing the product stream obtained in step b) into a second reactor at a temperature of from 150°C to 240°C and a pressure of from 15 to 100 bar and catalytically hydrogenating it in the gas phase to optionally alkyl-substituted 1,4-butanediol;
 - d) removing the desired product from intermediates, by-products and any unconverted reactant;
 - e) optionally recycling unconverted intermediates into one or both hydrogenation stages,
- said hydrogenation stages each using a catalyst which is free from chromium which comprises $\leq 95\%$ by weight of CuO, and $\geq 5\%$ by weight of an oxidic support, and said second reactor having a higher pressure than said first

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reactor.

28. (new) A process as claimed in claim 27, wherein the entrance temperature into the first reactor is from 235 to 270°C and the entrance temperature into the second reactor is from 175°C to 225°C.
29. (new) A process as claimed in claim 27, wherein the hot spot temperature in the first reactor is from 210 to 310°C, and the process is carried out in such a manner that the hot spot temperature is above the entrance temperature and the exit temperature of the reaction gases, and is from 5 to 30°C above the entrance temperature.
30. (new) A process as claimed in claim 27, wherein the pressure in the first hydrogenation stage is from 2 to 20 bar and the pressure in the second hydrogenation stage is from 35 to 80 bar.
31. (new) A process as claimed in claim 27, wherein the catalyst space velocity of the first hydrogenation stage is in the range from 0.02 to 1kg of reactant/l catalyst • hour, and the catalyst space velocity of the second hydrogenation stage is in the range from 0.02 to 1.5 kg of reactant/l of catalyst • hour.
32. (new) A process as claimed in claim 27, wherein the hydrogen/reactant molar ratio in both reaction stages is > 5.
33. (new) A process as claimed in claim 32, wherein the hydrogen/reactant ratio in the first stage hydrogenation is from 20 to 200 .
34. (new) A process as claimed in claim 27, wherein the reactors used are selected from the group consisting of tubular reactors, shaft reactors, reactors having

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- internal heat removal means, tube bundle reactors and fluidized bed reactors.
35. (new) A process as claimed in claim 34, wherein the tube bundle reactor is used in the first hydrogenation stage.
36. (new) A process as claimed in claim 34, wherein a shaft reactor is used in the second hydrogenation stage.
37. (new) A process as claimed in claim 27, wherein more than one reactor connected in parallel or in series is used in the first and/or second hydrogenation stage.
38. (new) A process as claimed in claim 27, wherein the support material of the catalyst is selected from the group of ZnO, Al₂O₃, SiO₂, TiO₂, ZrO₂, CeO₂, MgO, CaO, SrO, BaO and Mn₂O₃ and mixtures thereof.
39. (new) A process as claimed in claim 38, wherein the support material of the catalyst is selected from the group of ZnO/Al₂O₃ mixtures, the delta-, theta-, alpha- and eta- modifications of Al₂O₃ and also mixtures which comprise at least one component each firstly from the group of SiO₂, TiO₂, ZrO₂, and secondly from the group of ZnO, MgO, CaO, SrO and BaO.
40. (new) A process as claimed in claim 38, wherein the support material is selected from ZnO, ZnO/Al₂O₃ mixtures in a weight ratio of from 100:1 to 1:2 and mixtures of SiO₂ with at least one of MgO, CaO and ZnO in a weight ratio of 200:1 to 1:1.
41. (new) A process as claimed in claim 27, wherein the catalyst comprises one or more further metals or a compound of one or more further metals, preferably an oxide, from groups 1 to 14 of the Periodic Table.

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42. (new) A process as claimed in claim 27, wherein the catalyst is used in the form of shaped bodies.
43. (new) A process as claimed in claim 27, wherein the BET surface area of the copper catalysts in the oxidic state is from 10 to 300 m²/g.
44. (new) A process as claimed in claim 27, wherein the copper surface area of the reduced catalyst in the installed state is > 0.2 m²/g.
45. (new) A process as claimed in claim 27, wherein the catalyst used in the first and second reactors are identical or different.
46. (new) A process as claimed in claim 27, wherein the shaped bodies of the catalyst used have a pore volume of ≥ 0.01 ml/g for pore diameters of > 50 nm.
47. (new) A process as claimed in claim 27, wherein the ratio of micropores having a diameter of > 50 nm to the total pore volume for pores having a diameter of > 4 nm is > 10%.
48. (new) A process as claimed in claim 27, wherein the reactant used in the reaction is maleic anhydride.
49. (new) A process as claimed in claim 27, wherein maleic anhydride is used which has been prepared by oxidizing benzene, C₄-olefins or n-butane, and the crude maleic anhydride obtained by oxidation has been extracted from the crude product mixture using a solvent and then stripped from this solvent using hydrogen.
50. (new) A process as claimed in claim 27, wherein the absorbent is selected from the group consisting of tricresyl phosphate, dibutyl maleate, high molecular

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weight waxes, aromatic hydrocarbons having a molecular weight of from 150 to 400 and a boiling point above 140°C.

51. (new) A process as claimed in claim 50, wherein the absorbent is selected from the group consisting of dibenzene, di-C₁-C₄ alkyl esters of aromatic and aliphatic dicarboxylic acids, methyl esters of long-chain fatty acids having from 14 to 30 carbon atoms, high boiling ethers, dimethyl ethers of polyethylene glycol and alkyl phthalates and dialkyl phthalates having C₁-C₁₈ alkyl groups.
52. (new) A process as claimed in claim 50, wherein the absorbent is selected from the group consisting of dimethyl-2,3-naphthalene dicarboxylate, dimethyl-1,4-cyclohexane dicarboxylate, tetraethylen glycol, dimethyl phthalate, diethyl phthalate, dibutyl phthalate, di-n-propyl and di-isopropyl phthalate, undecyl phthalate, diundecyl phthalate, methyl phthalate, ethyl phthalate, butyl phthalate, n-propyl phthalate and isopropyl phthalate.
53. (new) A process as claimed in claim 27, wherein the maleic anhydride is stripped from the absorbent under reduced pressure or pressures which correspond to the hydrogenation pressure or are a maximum of 10% above this pressure.
54. (new) A process as claimed in claim 27, which is carried out batchwise, semicontinuously or continuously.
55. (new) A process as claimed in claim 27, wherein the SA is removed by partial condensation.